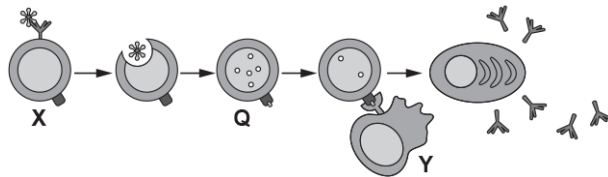


Communicable diseases, disease prevention and the immune system

1. Which row, **A** to **D**, identifies cells **X** and **Y** and process **Q** in the immune response in the diagram below?

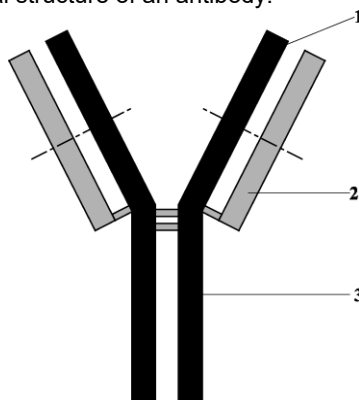


	X	Y	Q
A	B cell	T helper cell	antigen presentation
B	phagocyte	T helper cell	clonal expansion
C	T cell	B memory cell	endocytosis
D	B cell	T killer cell	antigen presentation

Your answer

[1]

2. The diagram represents the general structure of an antibody.



Which of the following numbered part(s) of the diagram represent the part of the antibody that has the same sequence of amino acids in all antibodies?

- A. 1, 2 and 3
- B. Only 1 and 2
- C. Only 2 and 3
- D. Only 1

Your answer

[1]

3. Which statement, **A** to **D**, correctly describes a process that provides artificial active immunity?

- A. an injection of active antibodies for tetanus
- B. antigens for polio given in a sugar cube
- C. antibodies provided in milk from a breast-feeding mother
- D. antigens received on flu viruses via water droplets in the air

Your answer

[1]

4. A patient has been diagnosed with an autoimmune disease.

Which of the treatments, **A** to **D**, is most likely to relieve the symptoms?

- A** a course of antibiotics
- B** a vaccination containing antibodies
- C** drugs to suppress the immune system
- D** surgery to remove the affected parts

Your answer

[1]

5. The following statements are about organisms that cause disease.

- 1. Athletes foot and ringworm are caused by fungi.
- 2. Malaria and tuberculosis are caused by protocistans.
- 3. Ring rot and black sigatoka are caused by bacteria.

Which of the statement(s) is/are correct?

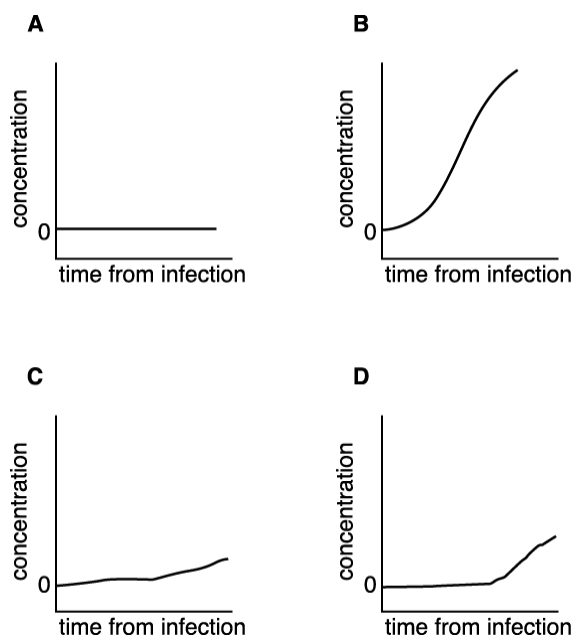
- A** 1, 2 and 3
- B** only 1 and 2
- C** only 2 and 3
- D** only 1

Your answer

[1]

6. The graphs below show the concentration of antibodies in the blood of four people after a first natural exposure to an antigen. One of the people had been vaccinated against this antigen previously.

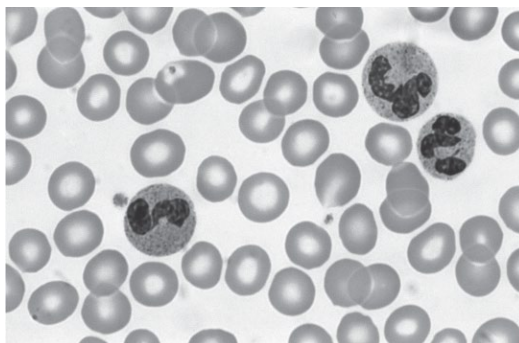
Which of the graphs, **A** to **D**, represents the person who had been vaccinated?



Your answer

[1]

7. The photograph below shows a blood smear.



Which row correctly lists the cells that are visible in the smear?

	erythrocytes	lymphocytes	monocytes	neutrophils
A	√	x	√	√
B	√	x	x	√
C	√	√	√	x
D	x	√	√	√

Your answer

[1]

8. Which of the options, **A** to **D**, is a primary defence against pathogens?

- A** antibody production
- B** inflammation
- C** phagocytosis
- D** T-killer

Your answer

[1]

9. Three methods of pathogen transmission between animals or plants are listed below.

- 1 direct contact
- 2 Vectors
- 3 droplets

Which of the methods of pathogen transmission can apply to plants?

- A** 1, 2 and 3
- B** Only 1 and 2
- C** Only 2 and 3
- D** Only 1

Your answer

[1]

10. Which of the following statements about antibiotic resistance is correct?

- A** All antibiotics cause mutations in bacterial DNA.
- B** Antibiotic resistance in bacteria is evidence to support Darwin's theory of evolution by natural selection.
- C** The development of antibiotic resistance in bacteria is an example of genetic drift.
- D** The development of antibiotic resistance in bacteria is an example of stabilising selection.

Your answer

[1]

11. Which of the following antibodies increase(s) the phagocytosis of pathogens?

- 1 opsonins
- 2 agglutinins
- 3 anti-toxins

- A 1, 2 and 3
- B Only 1 and 2
- C Only 2 and 3
- D Only 1

Your answer

[1]

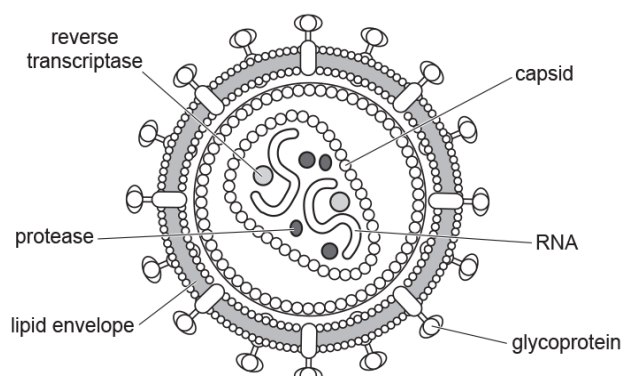
12. Which of the following describes an autoimmune disease?

- A a disease in which an individual's own body cells are antigenic
- B a disease in which a pathogen attacks cells of the immune system
- C a disease that prevents production of antibodies
- D a disease to which an individual has developed immunity

Your answer

[1]

13. The diagram below shows a pathogen.



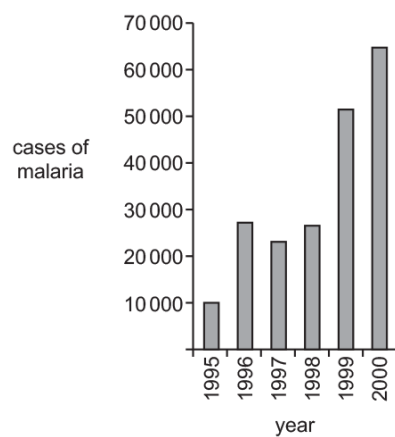
Which of the options, **A** to **D**, is the disease caused by this pathogen?

- A** HIV / AIDS
- B** potato blight
- C** ringworm
- D** tuberculosis

Your answer

[1]

14. The chart shows the number of reported cases of malaria in South Africa between 1995 and 2000.



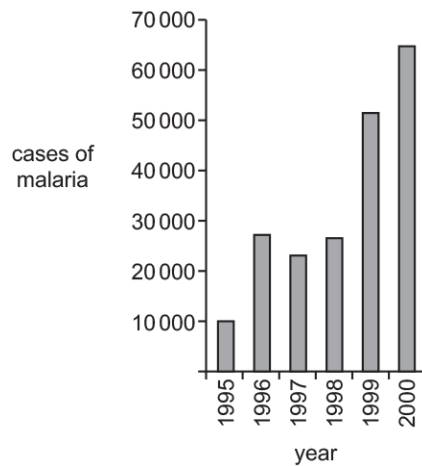
Which of the following, **A** to **D**, is the percentage increase from the number of cases of malaria in 1995 to 2000?

- A** 85%
- B** 550%
- C** 650%
- D** 55 000%

Your answer

[1]

15. The chart shows the number of reported cases of malaria in South Africa between 1995 and 2000.



Which of the following statements, **A** to **D**, could explain the data shown for 1999-2000?

- A** the malarial parasite had developed resistance to insecticides
- B** the vector had developed resistance to antibiotics
- C** the malarial parasite had developed resistance to antiviral drugs
- D** the vector had developed resistance to insecticides

Your answer

[1]

16. Rheumatoid arthritis is a long-term condition that causes pain, swelling and stiffness in the joints.

Which of the following, **A** to **D**, explains why stem cells are a potential source of treatment for rheumatoid arthritis?

- A** Stem cells can be harvested from the umbilical cords of newborn babies.
- B** Stem cells are cheaper than other drug-based therapies.
- C** Stem cells allow regeneration of a variety of tissue types.
- D** Stem cells can be obtained from embryos without any ethical concerns.

Your answer

[1]

17. Biodiversity is important for the development of new medicines.

Which of the following statements about the development of new medicines is **incorrect**?

- A Computer modelling can be used to identify useful medicinal compounds.
- B Genetically modified bacteria can be used to synthesise medicines.
- C Many pathogenic bacteria have become immune to antibiotics.
- D Microorganisms are an important source of new medicines.

Your answer

[1]

18. Which of the following is/are **not** involved in the primary response against infection?

- A memory B-cells
- B mast cells
- C mitosis
- D platelets

Your answer

[1]

19. Which of the following, **A to D**, is an example of disease transmitted by a vector?

- A athlete's foot from a shower
- B bubonic plague from rat fleas
- C catching bird flu from inhaling water droplets
- D salmonella from undercooked chicken

Your answer

[1]

20. Lupus is a rare condition affecting approximately 0.025% of the population. However, 9 out of 10 sufferers are women.

The population of England and Wales in 2019 was approximately 64 million.

Which of the following estimates shows the number of men in England and Wales suffering from lupus?

- A** 160
- B** 1600
- C** 16 000
- D** 160 000

Your answer

[1]

21. Lupus is an autoimmune disease that affects the skin, joints and internal organs.

Which of the following is likely to be an effective treatment for lupus?

- A** immunosuppressant drugs
- B** injection of antibodies from someone who does not suffer from lupus
- C** somatic gene therapy
- D** vaccination

Your answer

[1]

22. The primary immune response involves differentiation and clonal expansion of certain white blood cells.

Which of the following cells result from clonal expansion during the primary immune response?

- 1 plasma cells
- 2 B-memory cells
- 3 T-memory cells

- A** 1, 2 and 3
- B** only 1 and 2
- C** only 2 and 3
- D** only 1

Your answer

[1]

23. Antibodies form part of the immune response.

Which of the following types of antibody bind to antigens on the surface of pathogens?

- 1 opsonins
- 2 agglutinins
- 3 anti-toxins

- A** 1, 2 and 3
- B** only 1 and 2
- C** only 2 and 3
- D** only 1

Your answer

[1]

24. Plants can produce a variety of chemicals in response to pathogens.

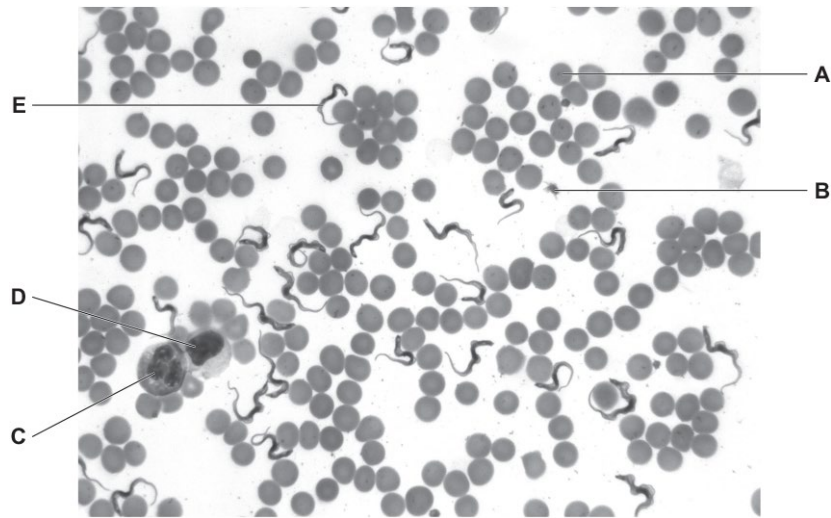
Which of the following, **A** to **D**, is produced by plants in response to pathogens?

- A** antibacterial compounds
- B** antibodies
- C** ethylene
- D** penicillin

Your answer

[1]

25. The image below shows a human blood smear.



The cell labelled **E** shows a parasite called *Trypanosoma*.

Which of the following statements is/are evidence that *Trypanosoma* is a eukaryote?

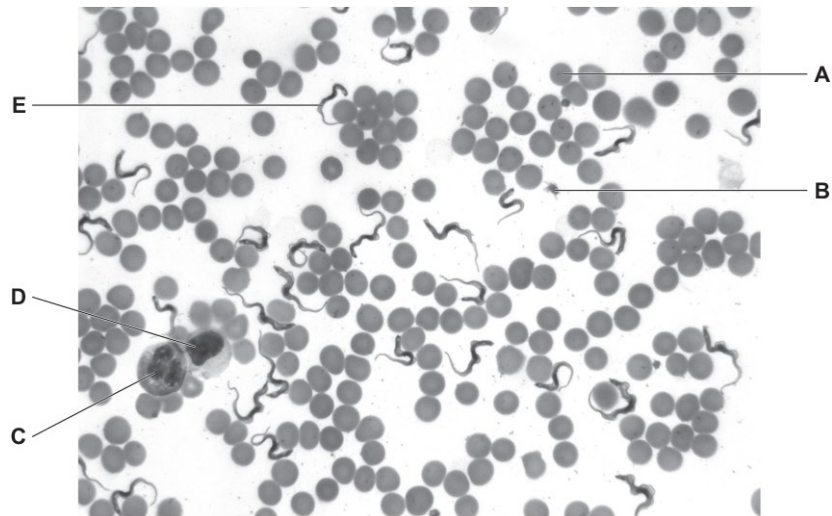
- 1 a nucleus is present
- 2 it is a similar size to blood cells
- 3 the presence of flagella

- A** 1, 2 and 3
B only 1 and 2
C only 2 and 3
D only 1

Your answer

[1]

26. The image below shows a human blood smear.



Which of the blood components, labelled **A** to **D**, shows a lymphocyte?

Your answer

[1]

27. Which of the following plant diseases, **A** to **D**, is caused by a pathogen from the kingdom Protocista?

- A** black sigatoka in bananas
- B** ring rot in tomatoes
- C** tobacco mosaic disease
- D** tomato late blight

Your answer

[1]

28. Which of the following human diseases, **A** to **D**, is caused by a fungus?

- A** athlete's foot
- B** influenza
- C** malaria
- D** tuberculosis

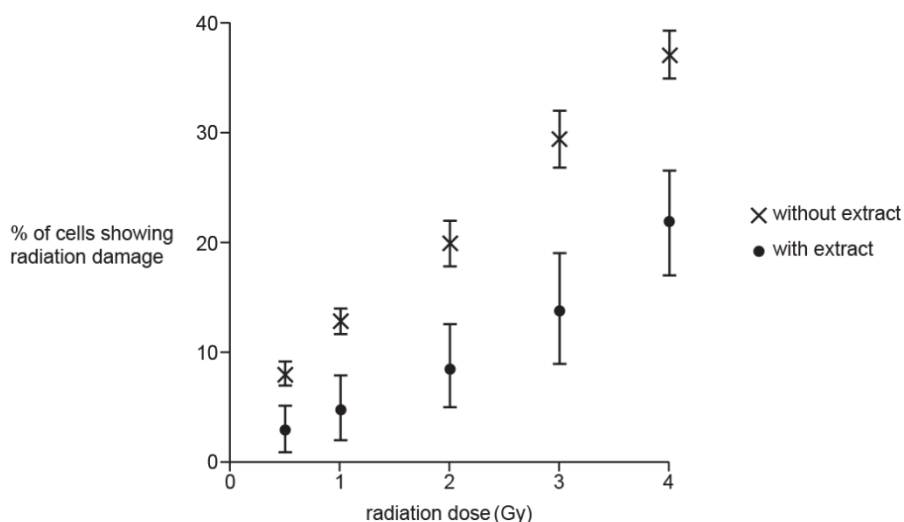
Your answer

[1]

29. An extract of the bark of the Indian fig tree, *Ficus racemosa*, has antioxidant properties. It has been suggested that this extract could protect against damage to non-cancerous cells during radiotherapy.

Cultures of non-cancerous cells were exposed to increasing doses of radiation and the percentage of damaged cells was measured. The experiments were performed multiple times either with or without the bark extract.

The graph shows the results for the two sets of data. Each data point shows the mean \pm 1 standard deviation.



Which of the following statements, **A** to **D**, about the graph is correct?

- A** The data for the 'with extract' group is more variable than the data for the 'without extract' group.
- B** The error bars show the range of data at each radiation dose.
- C** The error bars show whether the difference between the two sets of data is significant.
- D** The χ^2 (chi-squared) test can be used to determine whether there is a significant difference between the two sets of data.

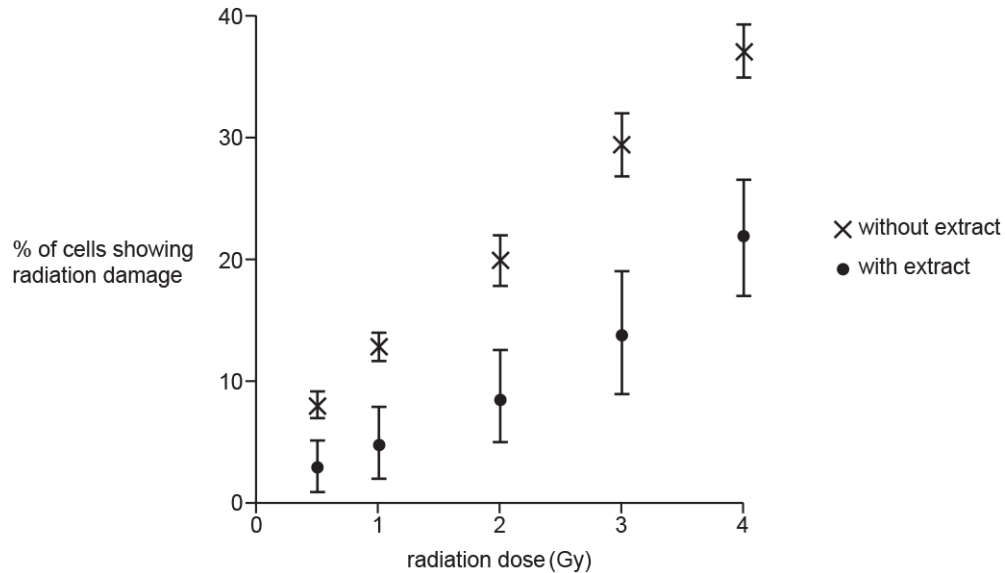
Your answer

[1]

30. An extract of the bark of the Indian fig tree, *Ficus racemosa*, has antioxidant properties. It has been suggested that this extract could protect against damage to non-cancerous cells during radiotherapy.

Cultures of non-cancerous cells were exposed to increasing doses of radiation and the percentage of damaged cells was measured. The experiments were performed multiple times either with or without the bark extract.

The graph shows the results for the two sets of data. Each data point shows the mean \pm 1 standard deviation.



A student used Spearman's rank correlation coefficient to test for correlation between radiation dose and cell damage.

Which of the following statements, **A** to **D**, about this correlation shown on the graph is correct?

- A** Spearman's rank correlation coefficient, r_s , for cells without extract will be between 0 and +1.
- B** Spearman's rank correlation coefficient, r_s , for cells with extract will be between 0 and -1.
- C** There is a negative correlation between radiation dose and cell damage in both cases.
- D** There is no correlation between radiation dose and cell damage in either case.

Your answer

[1]

31. Plants such as the soybean have a number of defence strategies to prevent infection by pathogens.

Which of the following strategies is a chemical defence against pathogen infection?

- A** callose deposits at sieve tube ends that prevent pathogen movement in phloem
- B** hydrolytic enzymes such as chitinase found between cells
- C** stomata can be closed by guard cells if pathogens are detected
- D** cell walls can be thickened by lignin, making cell entry very difficult for pathogens

Your answer

[1]

32. Which of the following types of cells is **not** involved in a primary immune response?

- A T-memory cells
- B T-helper cells
- C T-killer cells
- D plasma cells

Your answer

[1]

33. Autoimmune diseases are often treated with a course of antibody injections.

Which of the following statements, **A to D**, describes the immunity arising from this treatment?

- A active natural immunity
- B active artificial immunity
- C passive natural immunity
- D passive artificial immunity

Your answer

[1]

34. An individual bitten by a rabid dog can be treated by an injection of human rabies antibodies.

Which option, **A to D**, describes the type of immunity provided by this treatment?

- A natural passive
- B natural active
- C artificial passive
- D artificial active

Your answer

[1]

35. Lupus is an autoimmune disease. One symptom is a facial rash, typically in a butterfly shape across the cheeks.

Following a blood test, which of the following would indicate the patient has Lupus?

- A the presence of antibodies for the cell surface antigens of connective tissue
- B the presence of herpes antibodies
- C the presence of high levels of antihistamines
- D the absence of B lymphocytes

Your answer

[1]

36. Tropical rainforests have a very high biodiversity of plant species.
Which of the statements, **A to D**, is an economic benefit of high biodiversity?

- A High plant biodiversity decreases the animal biodiversity in the rainforest.
- B High plant biodiversity increases the organic matter in rainforest soils.
- C High plant biodiversity supports drug discovery and development.
- D High plant biodiversity protects the ecosystem from environmental changes.

Your answer

[1]

37. Which formula would you use to estimate the volume of a neutrophil?

- A. $4\pi r^2$
- B. $2\pi r$
- C. $\pi r^2 h$
- D. $\frac{4}{3}\pi r^3$

Your answer

[1]

38. Which of the following descriptions is correct?

- A. Vaccination gives long-term protection, immunisation gives short-term protection.
- B. Vaccination involves injection of antigenic material and immunisation is the process of developing immunity.
- C. Vaccination involves injection of antigenic material, immunisation is injection of antibodies.
- D. Vaccination and immunisation have the same meaning.

Your answer

[1]

39. Young mammals receive antibodies in their mother's milk.

This is an example of which type of immunity?

- A. artificial active immunity
- B. artificial passive immunity
- C. natural active immunity
- D. natural passive immunity

Your answer

[1]

40. Tuberculosis is an infectious disease that affects humans. It is caused by a pathogen.

Pathogens can also cause diseases in plants.

Which of the following plant diseases is caused by the same **type** of pathogen that causes tuberculosis in humans?

- A black sigatoka in bananas
- B 'mosaic' leaf discolouration in tobacco plants
- C ring rot in tomatoes
- D late blight in potatoes

Your answer

[1]